

estimated to be 4.7×10^{-8} per year, or 2.3×10^{-7} over the 5 years of activities at the White Mesa Mill site.

The risks calculated under these two unique exposure pathways would be less than those predicted for the members of the general population in Section 4.4.15.1 for the disposal of the Moab site mill tailings at the White Mesa Mill site.

Disproportionate adverse impacts to minority and low-income populations would occur under this alternative as a result of unavoidable adverse impacts on potential traditional cultural properties located on and near the White Mesa Mill site, the proposed White Mesa Mill pipeline route, White Mesa Mill borrow area, and Blanding borrow area (see Sections 4.4.9 and 4.5). At least 11 potential traditional cultural properties would be unavoidably and adversely affected. If this alternative were implemented, the likelihood that additional traditional cultural properties would be located (once cultural studies were completed) is extremely high. These sacred, religious, and/or ceremonial sites are associated with the Ute, Navajo, and Hopi cultures and peoples.

4.5 Borrow Areas

Impacts at borrow areas are discussed here as a separate, stand-alone topic in response to a request by BLM, one of the cooperating agencies. BLM indicated that analyzing impacts to borrow areas as a stand-alone topic would facilitate the subsequent analyses necessary to authorize DOE to use borrow material at BLM-managed borrow areas.

DOE assessed the potential impacts of removing borrow materials from 10 borrow areas (Crescent Junction, Floy Wash, Courthouse Syncline, Klondike Flats, Tenmile, Blue Hills Road, LeGrand Johnson, Papoose Quarry, Blanding, and White Mesa Mill). Figure 2–8 shows the locations of the 10 borrow areas analyzed.

As shown in [Table 4–52](#), the impacts of removing materials from the proposed borrow areas would be similar among all the sites. Four of the sites (Floy Wash, LeGrand Johnson, Papoose Quarry, and Blanding) are existing borrow areas. Five other sites are on land managed by BLM (Crescent Junction, Courthouse Syncline, Klondike Flats, Tenmile, and Blanding) and would require the issuance of a borrow area permit by BLM. The acreages identified in Table 4–52 for BLM-managed borrow areas have been segregated for DOE’s use.

Construction or upgrading of roads necessary to transport materials from borrow areas to vicinity properties or the Moab site may affect floodplains and wetlands, if present.

Short-term land use impacts would occur on borrow sites providing materials for construction. All borrow sites except those associated with the White Mesa Mill site are within grazing allotments for BLM and, grazing rights could be temporarily vacated. The borrow sites would be reclaimed, and the acreage would be available for any uses designated prior to mineral extraction. There would be no land use impacts from materials procured from commercial operations.

Table 4-52. Impacts at Anticipated Borrow Areas

	Crescent Junction	Floy Wash	Courthouse Syncline	Klondike Flats	Tenmile	Blue Hills Road	LeGrand Johnson	Papoose Quarry	Blanding (use only at White Mesa Mill site)	White Mesa Mill (use only at White Mesa Mill site)
Available area	2,241 acres	374 acres	2,730 acres	2,819 acres	2,062 acres	1,760 acres	13 million yd ³	3.5 million yd ³	1,355 acres	63–83 acres
Geology and Soils	Removal of cover soils Potential for erosion Depletion of developed soil resources No road improvements required	Removal of cover soils No road improvements required	Removal of cover soils 4.5 miles of new road construction required	Removal of radon barrier material 2 miles of new road construction required	Removal of cover soils 4.5 miles of road improvements required	Removal of cover soils No road improvements required	Removal of sand and gravel Existing commercial gravel pit	Removal of limestone to be used as riprap Currently operating quarry	Removal of riprap Existing operation	Removal of soils and clay
Air Quality	Minor impacts due to dust; control measures would be implemented.	Minor impacts due to dust; control measures would be implemented.	Minor impacts due to dust; control measures would be implemented.	Minor impacts due to dust; control measures would be implemented.	Minor impacts due to dust; control measures would be implemented.	Minor impacts due to dust; control measures would be implemented.	Minor impacts due to dust; control measures would be implemented.	Minor impacts due to dust; control measures would be implemented.	Minor impacts due to dust; control measures would be implemented.	Minor impacts due to dust; control measures would be implemented.
Surface Water	No streams in the vicinity. Surface water could be ponded in pits in the borrow area for short periods after infrequent heavy rains.	Ephemeral Floy Wash, just west of the borrow area, would not be affected. Surface water could be ponded in pits in the borrow area for short periods after infrequent heavy rains.	Ephemeral Thompson and Crescent washes join in the vicinity, but no impact would occur. Surface water could be ponded in pits in the borrow area for short periods after infrequent heavy rains.	No streams in the vicinity. Surface water could be ponded in pits in the borrow area for short periods after infrequent heavy rains.	No streams occur in the vicinity. Surface water could be ponded in pits in the borrow area for short periods after infrequent heavy rains.	Ephemeral tributary to Bartlett Wash in the vicinity would not be affected. Surface water could be ponded in pits in the borrow area for short periods after infrequent heavy rains.	No change to existing impacts.	No change to existing impacts.	No streams occur at the site, situated on an alluvial terrace above the canyon of Recapture Creek to the east. Excess sedimentation and interruption of flows could influence the Recapture Creek drainage. Surface water could be ponded in pits in the borrow area for short periods after infrequent heavy rains.	An ephemeral wash draining southward through the site would not be affected. Surface water could be ponded in pits in the borrow area for short periods after infrequent heavy rains.

Table 4–52. Impacts at Anticipated Borrow Areas (continued)

	Crescent Junction	Floy Wash	Courthouse Syncline	Klondike Flats	Tenmile	Blue Hills Road	LeGrand Johnson	Papoose Quarry	Blanding (use only at White Mesa Mill site)	White Mesa Mill (use only at White Mesa Mill site)
Ground Water	No impact would occur to the deep (approximately 3,000 ft) ground water beneath the site.	No impact would occur to the deep (approximately 3,000 ft) ground water beneath the site.	No impact would occur to the deep (approximately 1,000 ft) ground water beneath the site.	No impact would occur to the deep (approximately 500 ft) ground water beneath the site.	Short-term positive impact to the shallow ground water (less than 200 ft deep) during the infrequent occurrence of ponded water from heavy rains that would recharge the aquifer.	No impact would occur to the deep (at least 600 ft) ground water beneath the site.	No change to existing impacts.	No change to existing impacts.	Short-term positive impact to the shallow perched ground water during the infrequent occurrence of ponded water from heavy rains that would recharge the aquifer.	No impact would occur to the deep (approximately 1,000 ft) ground water beneath the site.
Floodplains/ Wetlands	No known impacts.	Possible short-term impact to nearby wetland areas due to runoff.	No known impacts.	No known impacts.	Sensitive wetland system in nearby wash. Emergent and shrubby wetlands subject to degradation due to runoff.	Possible short-term impact to nearby wetland due to runoff.	No known impacts.	No known impacts.	No known impacts.	Borrow area may contain small wetlands. Probable short-term adverse impacts due to excavation.
Aquatic Ecology	No aquatic resources present.	No aquatic resources present.	No aquatic resources present.	No aquatic resources present.	No aquatic resources present.	No aquatic resources present.	No aquatic resources present.	No aquatic resources present.	No aquatic resources present.	No aquatic resources present.

Table 4–52. Impacts at Anticipated Borrow Areas (continued)

	Crescent Junction	Floy Wash	Courthouse Syncline	Klondike Flats	Tenmile	Blue Hills Road	LeGrand Johnson	Papoose Quarry	Blanding (use only at White Mesa Mill site)	White Mesa Mill (use only at White Mesa Mill site)
Terrestrial Ecology	<p>Loss of up to 100 acres of habitat in an area of limited wildlife diversity and densities.</p> <p>Federally listed black-footed ferret, the white-tailed prairie dog (currently in review of federal listing), ferruginous hawk, and peregrine falcon could be present.</p> <p>Proximity of the Book Cliffs could increase the potential occurrence of cliff-dwelling raptors.</p> <p>No sensitive or critical habitat identified for wildlife species on or near the site.</p>	<p>Loss of up to 380 acres of habitat used by pronghorn antelope, jackrabbits, coyotes, and other mammals.</p> <p>Federally listed black-footed ferret and the white-tailed prairie dog (currently in review of federal listing) could occur on or near the site.</p>	<p>Loss of up to 155 acres of habitat in an area of sparse vegetation and low-quality wildlife habitat.</p> <p>Ephemeral wash on the southern perimeter may provide cover and habitat for small mammals.</p> <p>No critical winter or summer range identified for wildlife in this area.</p> <p>Federally listed black-footed ferret and the white-tailed prairie dog (currently in review of federal listing) could occur on or near the site.</p>	<p>Loss of up to 170 acres of habitat in an area of sparse vegetation and low-quality wildlife habitat.</p> <p>No critical winter or summer range identified for wildlife in this area.</p> <p>Federally listed black-footed ferret and the white-tailed prairie dog (currently in review of federal listing) could occur on or near the site.</p>	<p>Loss of up to 250 acres of habitat in an area of sparse vegetation and low-quality wildlife habitat.</p> <p>No critical winter or summer range identified for wildlife in this area.</p> <p>Federally listed black-footed ferret and the white-tailed prairie dog (currently in review of federal listing) could occur on or near the site.</p>	<p>Loss of up to 185 acres of habitat in an area of sparse vegetation and low quality wildlife habitat.</p> <p>No critical winter or summer range has been identified for wildlife in this area.</p> <p>Federally listed black-footed ferret and the white-tailed prairie dog (currently in review of federal listing) could occur on or near the site.</p>	<p>Site is surrounded by other past or present quarry and borrow sites or other developments.</p> <p>Existing operations render the area less attractive for many wildlife species.</p> <p>No federally listed species are likely to be in the vicinity.</p>	<p>Local area has several other past or present quarry and borrow sites or other developments.</p> <p>Existing operations render the area less attractive for many wildlife species.</p> <p>No federally listed species are likely to be in the vicinity.</p>	<p>Loss of 8 to 10 acres of wildlife habitat in an area where wildlife diversity and abundance is evident.</p> <p>Mule deer migration routes identified south of this site and within mountain ranges both east and west of US-191; critical mule deer winter range is near the site.</p> <p>Federal candidate Gunnison sage grouse and burrowing owl could occur on or near the site, which is within the San Juan County Gunnison sage grouse conservation area.</p>	<p>Loss of up to 83 acres of habitat on IUC property.</p> <p>Vegetation relatively sparse, dominated by native piñon-juniper, saltbush and sagebrush communities.</p> <p>Federal candidate Gunnison sage grouse could occur on or near the site.</p> <p>No spotted owl critical habitat is present in this area.</p>

Table 4–52. Impacts at Anticipated Borrow Areas (continued)

	Crescent Junction	Floy Wash	Courthouse Syncline	Klondike Flats	Tenmile	Blue Hills Road	LeGrand Johnson	Papoose Quarry	Blanding (use only at White Mesa Mill site)	White Mesa Mill (use only at White Mesa Mill site)
Land Use	<p>70–100 acres of disturbance.</p> <p>Surface grazing rights and any subsurface oil and gas leases would be vacated until construction was completed.</p> <p>Area would be reclaimed and returned to BLM for prior designated uses.</p>	<p>178–380 acres of disturbance.</p> <p>Portions of the site have been used for quarry operations.</p> <p>Currently designated by BLM as a community pit area.</p>	<p>70–155 acres of disturbance.</p> <p>Surface grazing rights and any subsurface oil and gas leases would be vacated until construction was completed.</p> <p>Area would be reclaimed and returned to BLM for prior designated uses.</p>	<p>100–170 acres of disturbance.</p> <p>Surface grazing rights and any subsurface oil and gas leases would be vacated until construction was completed.</p> <p>Area would be reclaimed and returned to BLM for prior designated uses.</p>	<p>115–250 acres of disturbance.</p> <p>Surface grazing rights and any subsurface oil and gas leases would be vacated until construction was completed.</p> <p>Area would be reclaimed and returned to BLM for prior designated uses.</p>	<p>70–185 acres of disturbance.</p> <p>Surface grazing rights and any subsurface oil and gas leases would be vacated until construction was completed.</p> <p>Area would be reclaimed and returned for prior designated uses.</p>	<p>43,000–140,000 yd³ of disturbance.</p> <p>Existing commercial gravel pit.</p>	<p>185,000–257,000 yd³ of disturbance.</p> <p>Currently operating quarry.</p>	<p>8–10 acres of disturbance.</p> <p>Surface grazing rights and any subsurface oil and gas leases would be vacated until construction was completed.</p> <p>Area would be reclaimed and returned to BLM for prior designated uses.</p>	<p>300,000–400,000 yd³ of disturbance.</p> <p>Site is within IUC property boundaries on White Mesa Mill site.</p>
Cultural Resources	<p>On the basis of predictive modeling, 1 to 2 cultural sites could be adversely affected. Potential for traditional cultural properties is low.</p> <p>In consultation with affected parties, mitigation measures would be developed.</p>	<p>On the basis of predictive modeling, 1 to 2 cultural sites could be adversely affected. Potential for traditional cultural properties is low.</p> <p>In consultation with affected parties, mitigation measures would be developed.</p>	<p>On the basis of predictive modeling, 2 to 7 cultural sites could be adversely affected. Potential for traditional cultural properties is low.</p> <p>In consultation with affected parties, mitigation measures would be developed.</p>	<p>On the basis of predictive modeling, 3 to 7 cultural sites could be adversely affected. Potential for traditional cultural properties is low to medium.</p> <p>In consultation with affected parties, mitigation measures would be developed.</p>	<p>On the basis of predictive modeling, 4 to 11 cultural sites could be adversely affected. Potential for traditional cultural properties is low to medium.</p> <p>In consultation with affected parties, mitigation measures would be developed.</p>	<p>On the basis of predictive modeling, up to 8 cultural sites could be adversely affected. Potential for traditional cultural properties is low.</p> <p>In consultation with affected parties, mitigation measures would be developed.</p>	<p>No impact expected because materials would be removed from an existing excavation.</p>	<p>No impact expected because materials would be removed from an existing excavation.</p>	<p>On the basis of predictive modeling, 1 cultural site and at least 2 traditional cultural properties could be adversely affected.</p> <p>Given the density and variety of sites and importance attached to traditional cultural properties by numerous tribes, mitigation would be extremely difficult.</p>	<p>On the basis of previous cultural surveys conducted at this site and recent interviews with tribal members, up to 3 cultural sites and at least 3 traditional cultural properties could be adversely affected.</p> <p>Given the density and variety of sites and importance attached to traditional cultural properties by numerous tribes, mitigation would be extremely difficult.</p>

Table 4–52. Impacts at Anticipated Borrow Areas (continued)

	Crescent Junction	Floy Wash	Courthouse Syncline	Klondike Flats	Tenmile	Blue Hills Road	LeGrand Johnson	Papoose Quarry	Blanding (use only at White Mesa Mill site)	White Mesa Mill (use only at White Mesa Mill site)
Noise and Vibration	<p>Maximum noise assumed to be 95 dBA as a result of heavy equipment operations.</p> <p>An area with a radius of approximately 1,480 ft around the borrow area would exceed 65 dBA.</p> <p>Ground vibrations attenuate to background levels within 825 ft.</p>	<p>Maximum noise assumed to be 95 dBA as a result of heavy equipment operations.</p> <p>An area with a radius of approximately 1,480 ft around the borrow area would exceed 65 dBA.</p> <p>Ground vibrations attenuate to background levels within 825 ft.</p>	<p>Maximum noise assumed to be 95 dBA as a result of heavy equipment operations.</p> <p>An area with a radius of approximately 1,480 ft around the borrow area would exceed 65 dBA.</p> <p>Ground vibrations attenuate to background levels within 825 ft.</p>	<p>Maximum noise assumed to be 95 dBA as a result of heavy equipment operations.</p> <p>An area with a radius of approximately 1,480 ft around the borrow area would exceed 65 dBA.</p> <p>Ground vibrations attenuate to background levels within 825 ft.</p>	<p>Maximum noise assumed to be 95 dBA as a result of heavy equipment operations.</p> <p>An area with a radius of approximately 1,480 ft around the borrow area would exceed 65 dBA.</p> <p>Ground vibrations attenuate to background levels within 825 ft.</p>	<p>Maximum noise assumed to be 95 dBA as a result of heavy equipment operations.</p> <p>An area with a radius of approximately 1,480 ft around the borrow area would exceed 65 dBA.</p> <p>Ground vibrations attenuate to background levels within 825 ft.</p>	<p>Maximum noise assumed to be 95 dBA as a result of heavy equipment operations.</p> <p>An area with a radius of approximately 1,480 ft around the borrow area would exceed 65 dBA.</p> <p>Ground vibrations attenuate to background levels within 825 ft.</p>	<p>Maximum noise assumed to be 95 dBA as a result of heavy equipment operations.</p> <p>An area with a radius of approximately 1,480 ft around the borrow area would exceed 65 dBA.</p> <p>Ground vibrations attenuate to background levels within 825 ft.</p>	<p>Maximum noise assumed to be 95 dBA as a result of heavy equipment operations.</p> <p>An area with a radius of approximately 1,480 ft around the borrow area would exceed 65 dBA.</p> <p>Ground vibrations attenuate to background levels within 825 ft.</p>	<p>Maximum noise assumed to be 95 dBA as a result of heavy equipment operations.</p> <p>An area with a radius of approximately 1,480 ft around the borrow area would exceed 65 dBA.</p> <p>Ground vibrations attenuate to background levels within 825 ft.</p>
Visual Resources	<p>Might be visible from I-70.</p> <p>Compatible with Class III objectives.</p>	<p>Might be visible from I-70.</p> <p>Compatible with Class III objectives.</p>	<p>Not visible to general public.</p> <p>Compatible with Class III objectives.</p>	<p>Not visible to general public.</p> <p>Compatible with Class III objectives.</p>	<p>Would be visible to recreational users on adjacent road.</p> <p>Compatible with Class IV objectives.</p>	<p>Would be visible to recreational users on Blue Hills Rd.</p> <p>Not compatible with Class III objective during short term.</p> <p>Compatible with Class III objectives during long term.</p>	<p>No change to existing impacts.</p>	<p>No change to existing impacts.</p>	<p>Could be visible to travelers on US-191.</p> <p>Compatible with Class III objectives.</p>	<p>Would not be visible to the public.</p> <p>Compatible with Class III objectives.</p>

Table 4-52. Impacts at Anticipated Borrow Areas (continued)

	Crescent Junction	Floy Wash	Courthouse Syncline	Klondike Flats	Tenmile	Blue Hills Road	LeGrand Johnson	Papoose Quarry	Blanding (use only at White Mesa Mill site)	White Mesa Mill (use only at White Mesa Mill site)
Infrastructure	No impact to local or regional power supplies. Water requirements included in off-site disposal area impacts. Increased wear and tear on roads. No rail transportation required.	No impact to local or regional power supplies. Water requirements included in off-site disposal area impacts. Increased wear and tear on roads. No rail transportation required.	No impact to local or regional power supplies. Water requirements included in off-site disposal area impacts. Increased wear and tear on roads. No rail transportation required.	No impact to local or regional power supplies. Water requirements included in off-site disposal area impacts. Increased wear and tear on roads. No rail transportation required.	No impact to local or regional power supplies. Water requirements included in off-site disposal area impacts. Increased wear and tear on roads. No rail transportation required.	No impact to local or regional power supplies. Water requirements included in off-site disposal area impacts. Increased wear and tear on roads. No rail transportation required.	No impact to local or regional power supplies. Water requirements included in off-site disposal area impacts. Increased wear and tear on roads. No rail transportation required.	No impact to local or regional power supplies. Water requirements included in off-site disposal area impacts. Increased wear and tear on roads. No rail transportation required.	No impact to local or regional power supplies. Water requirements included in off-site disposal area impacts. Increased wear and tear on roads. No rail transportation required.	No impact to local or regional power supplies. Water requirements included in off-site disposal area impacts. Increased wear and tear on roads. No rail transportation required.
Waste	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.
Socio-economics	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.
Human Health	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.
Traffic	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.
Accidents	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.
Environmental Justice	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.	Included in disposal site impacts.

Tenmile, Blue Hills Road, and White Mesa Mill would be the sites with the highest potential for affecting cultural resources. DOE would conduct Class III cultural resource surveys as necessary to identify the precise numbers and types of cultural sites that could be present at the potential borrow sites, and would work with BLM (if the area were on land managed by BLM), the State Historic Preservation Officer, affected Native American tribes, and the Advisory Council on Historic Preservation to determine appropriate mitigation measures for affected sites if cultural resources were found.

Only two sites, LeGrand Johnson and Papoose Quarry, would not likely have federally listed threatened and endangered species occurring on or near the site. Appendix A1, “Biological Assessment,” discusses potential effects at these locations in more detail. If it is determined that species are present and could be adversely affected, DOE, in consultation with the USF&WS, BLM, and UDWR, would implement mitigation measures. Species that could be affected are discussed in Sections 4.1.7, 4.2.7, 4.3.7 and 4.4.7. Surveys and investigations would not be undertaken for existing commercial sites.

Potential impacts to plants and wildlife would be limited to terrestrial ecological resources during the time the borrow areas would be used. Because the borrow areas have no aquatic resources, no short-term or long-term impacts would occur. No long-term impacts to aquatic or terrestrial resources would occur following reclamation of the borrow areas.

4.6 No Action Alternative

Under the No Action alternative, no contaminated materials would be remediated or removed from the Moab site or vicinity properties. There would be no ground water remediation, and no site controls or activities to protect human health or the environment would be undertaken. All site activities, including operations and maintenance activities, would cease, and public access to the site would be unrestricted.

4.6.1 Geology and Soils

Impacts to geological resources underlying the tailings pile would be the same as those under the on-site disposal alternative, as stated in Section 4.1.1.1. Contaminated on-site soils would not be disturbed. In addition, without the mitigating effect of dike construction, the effects of floods of the Colorado River may progressively erode and remove the east side of the tailings over the next 1,000 years. Soil erosion would not be controlled, and contaminated materials, including soils, could discharge to Moab Wash and the Colorado River during storms.

4.6.2 Air Quality

Without continuing dust control, air quality standards relating to particulate emissions would be violated under the No Action alternative.

4.6.3 Ground Water

Existing conditions at the Moab site would persist under the No Action alternative. Because a ground water compliance strategy would not be developed, no remedial action would be taken. The three mechanisms for contaminant transport described in Section 4.1.3 (downward seepage